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EXAMINER

VARGAS, DIXOMARA

ART UNIT PAPER NUMBER

2859

DATE MAILED: 10/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/919,479

Applicant(s)

VAUGHAN ET AL.

Examiner

Dixomara Vargas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-66 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-22, 24, 25, 27-33, 36-38, 57, 58, 60, 61, 63 and 64 is/are rejected.
- 7) ☒ Claim(s) 23, 26, 34, 35, 39 - 56, 59, 62, 65 and 66 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 – 11, 16 – 22, 24, 25, 27 – 33, 36 – 38, 57, 58, 60 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaughn Jr. (U. S. patent 5,557,247) in view of Srinivasan et al. (U. S. patent 6,029,082).

With respect to claims 1, 16, 20 and 60, Vaughn discloses an apparatus comprising: a volume coil including a plurality of current elements (Figure 3A); wherein each current element includes a transmission line segment having a first current path and a parallel current path for the first current path wherein, for each current element of the plurality of current elements, the first current path is resonant with the parallel current return path (Column 10, Lines 43 – 54, Figures 5A – 5E).

Vaughn discloses the claimed invention as stated above except for the volume coil having an aperture formed by removal or displacement of one or more current elements from a regular or symmetric pattern or arrangement of current elements. However, Srinivasan discloses an aperture formed by the removal of current elements (Figures 1, 2, 4 and 6). Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to

use Srinivasan teachings about the removal of a current element with Vaughn's apparatus for the purpose of reducing the patient's claustrophobia and permit access to the patient.

3. With respect to claim 2, Vaughn discloses an apparatus comprising: a radio frequency magnetic unit, including a plurality of current elements that are asymmetrically arranged, wherein at least one current element includes a transmission line segment, having a first current path and a parallel return current path for the first current path (Figures 3A, 5A – 5E); and at least two current elements are reactively coupled (Columns 3 and 5, Lines 63 – 65 and 43 – 45, respectively).

4. With respect to claim 3, Vaughn discloses two or more current elements are physically disconnected on one or more ends (Figure 3A).

5. With respect to claim 4, Vaughn discloses a plurality of current elements are asymmetrically arranged about a substantially cylindrical form (Figure 3A).

6. With respect to claims 5, 17 and 19, Vaughn discloses each of the plurality of current elements comprises a resonant current element (Column 10, Lines 39 – 48).

7. With respect to claims 6 and 11, Vaughn discloses the claimed invention as stated above in paragraph 3, except for a static-field magnetic field unit having a bore, the radio frequency magnetic field unit inserted in the bore to form an imaging unit. However, Srinivasan discloses a static-field unit having a bore to insert the RF coil (Figure 1, #14). Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the known MR configuration or arrangement with Vaughn's apparatus for the purpose of applying a static magnetic field that polarizes the nuclear spins of the object to be examined obtaining MR signals by applying in addition an RF field.

8. With respect to claim 7, Vaughn discloses a plurality of current elements are inductively coupled to at least one of the plurality of current elements (Columns 3 and 5, Lines 63 – 65 and 43 – 45 respectively).

9. With respect to claim 8, Vaughn discloses a plurality of current elements are capacitively coupled to at least one of the plurality of current elements (Columns 3 and 5, Lines 63 – 65 and 43 – 45 respectively).

10. With respect to claims 9 and 18, Vaughn discloses an apparatus comprising a radio frequency magnetic field unit having a plurality of current elements wherein each current element includes a transmission line segment having a first current path and a parallel return current path for the first current path (Figures 3A, 5A – 5E, #9), the radio frequency magnetic field unit adapted to generate a desired magnetic field (Abstract).

Vaughn discloses the claimed invention as stated above except for the radio frequency magnetic field unit having a first aperture formed at an end of the radio frequency field unit and a second aperture that is substantially unobstructed, wherein the first aperture is contiguous to the second aperture. However, Srinivasan discloses an aperture formed by the removal of current elements (Figures 1, 2, 4 and 6). Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the removal of a current element with Vaughn's apparatus for the purpose of reducing the patient's claustrophobia and permit access to the patient.

11. With respect to claim 10, Vaughn discloses the claimed invention as stated above in paragraph 10, except for the second aperture has an arc having an arc length of between about 0° and about 90°. However, Srinivasan discloses an aperture formed by the removal of current

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elements (Figure 2). Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the removal of a current element with Vaughn's apparatus for the purpose of reducing the patient's claustrophobia and permit access to the patient.

12. With respect to claim 21, Vaughn discloses a remaining pattern or arrangement of the current elements is capable of producing a desired field and the desired field is restored, compensated or otherwise effected by adjustment of currents in the plurality of current elements (Abstract).

13. With respect to claim 22, Vaughn discloses the claimed invention as stated above in paragraph 3, except for the volume coil includes a top and one or more of the regular or symmetric pattern or arrangement of current elements is removed from the top for improve access from the top and the desired field is restored. However, Srinivasan discloses the volume coil includes a top and one or more of the regular or symmetric pattern or arrangement of current elements is removed from the top for improve access from the top and the desired field is restored (Figures 1, 2, 4 and 6). Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the removal of a current element with Vaughn's apparatus for the purpose of reducing the patient's claustrophobia and permit access to the patient.

14. With respect to claim 24, Vaughn discloses the volume coil includes two open ends (Figure 3A).

15. With respect to claims 25, 27 and 28, Vaughn discloses the volume coil capable of being use in head imaging (Abstract).

16. With respect to claim 29, Vaughn discloses the volume coil is capable of being used in extremity imaging (Abstract).

17. With respect to claim 30, Vaughn discloses the volume coil is capable of being used in foot and ankle imaging (Abstract).

18. With respect to claim 31, Vaughn discloses the volume coil includes an impedance and the impedance is adjusted to control the current in the plurality of current elements (Column 5, Lines 43 – 45).

19. With respect to claim 32, Vaughn discloses the impedance is adjusted by adjusting the capacitance (Column 3, Lines 63 – 65).

20. With respect to claim 33, Vaughn discloses the impedance is adjusted by adjusting the inductance (Column 5, Lines 43 – 45).

21. With respect to claims 36 and 37, Vaughn discloses a radio frequency conductive front end ring including a gap is coupled to the plurality of current elements and a radio frequency conductive back end ring including a gap is coupled to the plurality of current elements (Figure 3A, 9 and 12).

22. With respect to claim 38, Vaughn discloses the invention as stated above in paragraph 2 except for a slotted shield or cavity wall coupled to a plurality of radio frequency current elements. However, Srinivasan discloses the shield or cavity wall (Figure 1, #38). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan shielding with Vaughn's apparatus for the purpose of avoiding eddy currents or field leakage.

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23. With respect to claim 57, Vaughn discloses means to actively detune/retune the volume coil for use with the local receiver coil (Column 10, Lines 39 – 43).

24. With respect to claim 58, Vaughn discloses the volume coil is double tuned or multiple tuned (Column 10, Lines 39 – 43).

25. With respect to claim 63, Vaughn discloses the claimed invention as in paragraph 2 except for one or more aperture formed on a side of a radio frequency magnetic field unit to permit access to the subject's ears. However, Srinivasan discloses one or more apertures on a side of the radio frequency magnetic field unit (Figure 2). Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the current element's spacing or apertures with Vaughn's apparatus for the purpose of reducing the patient's claustrophobia and permit access to the patient.

26. Claims 12 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaughn in view of Srinivasan et al. (U. S. patent 5,543,711).

With respect to claim 12, Vaughn discloses an apparatus comprising: a radio frequency magnetic field unit having a plurality of current elements wherein each current element includes a transmission line segment having a first current path and a parallel return current path for the first current path (Figures 3A, 5A – 5E).

Vaughn discloses the claimed invention as stated above except for a first side aperture, a second side aperture and a pair of end apertures, the first side aperture and the second side aperture contiguous with each of the pair of end apertures. However, Srinivasan discloses two

side apertures and a pair of end apertures wherein the side apertures are contiguous with the end apertures (Figures 2 – 6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the removal of a current element with Vaughn's apparatus for the purpose of reducing the patient's claustrophobia and permit access to the patient.

27. With respect to claim 13, Vaughn discloses the claimed invention as stated above in paragraph 12 except for the first side aperture and the second side aperture are located along the curved arrangement and the first side aperture is located substantially opposite from the second side aperture. However, Srinivasan discloses the first side aperture and the second side aperture are located along the curved arrangement and the first side aperture is located substantially opposite from the second side aperture (Figures 2 – 6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the removal of a current element with Vaughn's apparatus for the purpose of reducing the patient's claustrophobia and permit access to the patient.

28. With respect to claim 14, Vaughn discloses the claimed invention as stated above in paragraph 12 except for a first side aperture having a first width and a second side aperture having a second width that is about equal to the first width. However, Srinivasan discloses a first side aperture having a first width and a second side aperture having a second width that is about equal to the first width (Figures 2 – 6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the removal of a current element with Vaughn's apparatus for the purpose of reducing the patient's claustrophobia and permit access to the patient.

29. With respect to claim 15, Vaughn discloses the claimed invention as stated above in paragraph 12 except for except for a static-field magnetic field unit having a bore, the radio frequency magnetic field unit inserted in the bore to form an imaging unit. However, Srinivasan discloses a static-field unit having a bore to insert the RF coil (Figure 1, #14). Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Srinivasan teachings about the known MR configuration or arrangement with Vaughn's apparatus for the purpose of applying a static magnetic field that polarizes the nuclear spins of the object to be examined obtaining MR signals by applying in addition an RF field.

30. Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vaughn in view of Srinivasan and further in view of Yui (U. S. patent 5,892,359).

With respect to claim 61, Vaughn and Srinivasan disclose the claimed invention as stated above in paragraph 2 except for a mirror or prism mounted over a window or aperture. However, Yui discloses the use of a mirror (Figure 21, #61). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Yui's teachings about a mirror in the antenna NMR system with Vaughn and Srinivasan's apparatus for the purpose of reducing the claustrophobia of the patient.

31. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vaughn, Srinivasan and Yui and further in view of Ziarati (U. S. patent 5,877,732).

With respect to claim 64, Vaughn, Srinivasan and Yui, disclose the claimed invention as stated above, except for an auditory communication device to communicate through one or more apertures. However, Ziarati discloses the use of the auditory communication in an NMR system (Figure 1, 2 and 10). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to Ziarati's teaching about the communication system with Vaughn, Srinivasan and Yui's apparatus for the purpose of enabling the communication between surgeon and patient to facilitate the MR procedure.

Allowable Subject Matter

32. Claims 23, 26, 34, 35, 39 – 56, 59, 62, 65 and 66 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

33. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional prior art cited in PTO 892 discloses MR volume coils structures with transmission lines.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is (703) 305-5705. The examiner can normally be reached on 8:00 am. to 4:30 pm..

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (703) 308-3875. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.



Dixomara Vargas
Art Unit 2859
October 19, 2003



Diego Gutierrez
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